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ON AMENITIES FOR AGED PEOPLE

Ans Vollering Peter Nijkamp

Research Memorandum 1988-40 september

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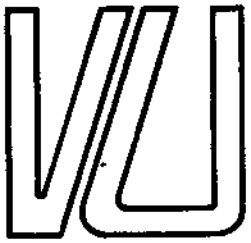

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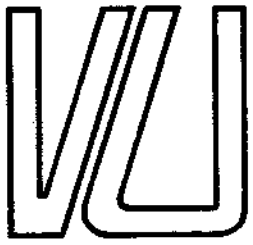

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SIZE AND DISTRIBUTION OF EXPENDITURES ON AMENITIES FOR AGED PEOPLE

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ABSTRACT

Size and distribution of expenditures on amenities for aged people

Many European countries are facing a situation of stagnating or declining population. The population forecasts for the Netherlands show a decline in population for the years following the year 2020. Besides this quantitative development, there is a qualitative shift: the aged population will grow in a relative and in an absolute sense.

The social, physical and psychological conditions of older people differ from those of the average population. Consequently, older people need more medical care, nursing, assistance in housekeeping, etc. Sometimes aged people are no longer capable of living on their own and may have to move to an old-age home or nursing home. The individual use of amenities may depend on the price the user has to pay, while in some cases the user-price depends on the supply-regulated financial contribution schemes for these amenities. In the financial contribution schemes the price is an income-based price: a household with a high income pays more for the use of a certain type of amenity than another household that has less income.

In this paper the impacts of public policy stimuli for changing these financial contribution schemes on the size and distribution of amenities for older people will be analyzed. After the introductory section the paper is organized as follows. Section 2 presents an outline of empirical demographic developments in the Netherlands and in a selected set of other countries. A brief survey of relevant literature on the specific supply and demand aspects of the older generation is given in section 3. In sections 4 and 5 a conceptual model will be developed for the supply and demand of amenities for older people, with an empirical application to the Dutch province of Zeeland. One of the most important features of the model is its orientation toward the micro-level. The main technique to be used is the micro-simulation technique. This micro-simulation model (MSM) is applied for the demand conditions of aged people in Zeeland, primarily because a fairly extensive and reliable disaggregate data set is available for this province. Section 6 presents some first results of this application.

Contents

1. Prologue

Interest in population dynamics and its relation with economics has been a critical part of social science research since the period of Malthus. The pathway of this research has exhibited varying focal points of interest, however. For instance, in the seventies much attention has been given to the consequences of overpopulation in the context of the 'limits to growth' discussion, whereas the eighties are increasingly facing a situation of qualitative (structural) shifts in population composition, notably the ageing process. In addition to a purely demographic analysis of such phenomena, the foreseeable economic impacts deserve full-scale attention. Research on the interface of demography and economics is fairly recent, witness also the new discipline of demo-economics (cf. Willekens and Rogers, 1977) and demometrics (cf. Sanderson, 1980).

It is noteworthy that the ageing process has two important aspects for scientific policy analysis, viz. an increasing life expectancy of older people and a decline in birth rates, leading to an increasing share of the older generation in our society accompanied by a stagnating or - in some countries - a declining population size. Furthermore, in addition to quantitative changes also qualitative shifts are taking place, inter alia regarding life style, consumption patterns, degree of independence etc. Attitudes on the care for the elderly have also shown drastic changes.

Consequently, there is a need for a more thorough investigation into the medium- and long-term impacts of ageing processes in our society. In the present paper the attention will be focused on the demand for specific amenities by the elderly. In general, the living circumstances of the older generation differ from those of the average population in that the members of old-age cohorts need other and more specific amenities, e.g. in terms of medical care, housing, social assistance and so forth. Sometimes aged people are no longer able to live their own independent life and hence have to move to an old-age home or a nursing home. Such adjusted life styles have serious financial and economic implications. Clearly, the individual use of specific amenities will often depend on the price the user has to pay,

while the user price is in turn co-determined by the - supply(government)-regulated - financial contribution schemes for these amenities. Thus, long-term socio-demographic dynamics are accompanied by serious economic implications and a variety of (often far-reaching) public policy measures. Consequently, there is a need for a rigorous research endeavour in the area of population economics.

In the framework of demo-economic models Willekens and Rogers (1977) have given the following typology:

(1) models of demo-economic growth. These models describe and explain demographic and/or economic growth by considering both demographic and economic variables in an interdependent way. The authors make a further distinction of such models into:
   . demometric growth models : inductive and empirically-oriented models for interdependent demographic and economic transition processes.
   . neoclassical growth models: deductive and theoretically oriented models for obtaining formal knowledge on supply-side dynamics and related population growth.
   . dualistic growth models: development-oriented migration and labour market models (e.g. Todaro, 1969).

(2) demo-economic simulation models. Such models are meant to demonstrate and compare impacts of alternative policies or of alternative trajectories of exogenous variables, and are therefore impact evaluation tools.

(3) models of demo-economic policy. These models serve to prescribe comprehensive demographic and economic policies; they may be either planning-oriented or theoretically-oriented.

The analysis in the present paper rests on a blend of the three above mentioned types of models. The approach employs both a theoretically-based and an empirically-oriented demo-economic analysis, in which both simulation experiments and planning interests are incorporated. In the present paper the impacts of changing financial contribution schemes of expenditures on the size and distribution of amenities for the older generation will be examined. In the financial contribution schemes price is income-related: a household with a high

income pays more for the use of a certain type of amenity than another household that has less income. We will first provide a brief sketch of population developments and related economic issues in a limited set of selected countries, viz. Sweden, Germany, United Kingdom and the Netherlands (section 2). Next, the Dutch demographic evolution and related recent economic and policy issues will be outlined in some more detail (section 3). In section 4 a conceptual model for the supply and demand of amenities for older people will be presented, with a specific orientation towards the micro level of analysis. In this context, micro-simulation models may be regarded as fruitful analytical tools. This micro-simulation technique will next be used in a first empirical application of our model to a data set on aged people in the Dutch province of Zeeland (sections 5 and 6). The paper will be concluded with an outlook for further research.

2. Current Demographic Trends in Some European Countries

Most European countries show largely similar population developments, although some variations among (and also within) countries can clearly be observed. Some figures will be used here to show population dynamics in four selected countries from the year 1960 on (see Table 1).

As can be seen from Table 1, population development in most other countries shows a slower growth than that in the Netherlands. Besides, there are relatively less older people in the Netherlands. In the year 1980 only 11.5 percent of the total population was over 65 years, whereas for example, in Sweden 16.2 percent of the total population was over 65 years of age. Population forecasts indicate a maintained relatively 'young' population for the Netherlands, compared to Sweden, the Federal Republic of Germany and the United Kingdom. Because these countries have more intensively been facing an older population than the Netherlands, in this section a brief summary of their past experiences concerning public policy and social adjustments with respect

to a growing older population will be given. Especially in the framework of our paper, it is of great interest to know the housing conditions of the elderly in these countries, and hence mainly those housing conditions will be discussed, with a special emphasis on the financial aspects of housing.

Table 1. Population (mln) in some European countries (in brackets the percentage of people of 65 years and over in the total population). Source: Kronjee and Tenhaeff, 1987, World Population Projections, 1984

	Sweden	United Kingdom	Germany	Netherlands
1960	7.5 (11.8)	52.5 (11.8)	55.1 (10.6)	11.4 (9.0)
1970	8.1 (13.8)	55.5 (13.0)	60.4 (13.2)	13.0 (10.0)
1980	8.3 (16.2)	55.9 (14.8)	61.5 (15.5)	14.1 (11.5)
1990	8.4 (17.6)	56.2 (15.5)	60.7 (14.9)	14.7 (12.7)
2000	8.5 (17.0)	56.9 (15.2)	60.4 (16.2)	15.2 (13.7)

In Sweden about 93 percent of all people over 65 years live on their own and about 5 percent live in a nursing home or an old age home. Government's policy is aimed at stimulating the elderly staying on their own, and hence the government has created fairly extensive facilities and amenities for this purpose. Local and regional government have a responsibility in administering and implementing the tasks related to these amenities. Personal care and household help is given by (municipally regulated) home assistance organisations, service centres are present in almost every municipality, and nursing help is given for one out of every ten elderly persons. Financial compensation for home assistance is given; the users of these facilities do on average not pay more than up to ten percent of the total cost involved. One additional feature of Sweden's policy for the elderly should be mentioned here, as this points to the direction of stimulating people living on their own with the help of a nursing family. It is possible for a given person, who takes care of his (or her) elderly family member, to get a financial allowance for doing so. About ten

percent of all nursing help for the elderly is given by family members. It would be interesting to know whether this high share is due to the above mentioned financial compensation.

The role of the family with regard to the elderly is in Germany somewhat different from that in Sweden. In the German law it is determined that children from a certain age onward have the obligation to contribute to the necessary provisions for their parents. Older persons with either a moderate or higher need for care live relatively more often with their children (cf. Bundesministerium fur Jugend, Familie, Frauen und Gesundheit, 1980), although also in these situations amenities for the elderly do exist (in which case personal allowances can be given). Allowances depend, however, not only on (among others) the income and assets of the intended user, but also on the income and assets of his or her children. It is noteworthy here that one out of every four children giving this care admits that he/she is acting under the force of kinship, and that sometimes also the elderly feel this obligation as a burden. Sometimes help is given on medical indication, because the costs of medical help are covered by means of social securities.

In the United Kingdom the main principle in government policy towards the elderly is that of community care. In recent years there is a trend from institutionalisation towards living on their own. There are more elderly people residing now in purpose-built housing complexes linked to a residential warden by an alarm system than there are in local authority homes for the old (Palmore, 1980). Facilities for respite care of people who take care of the elderly are available and are willingly used. Some financial compensation is given, but a large part of the cost has to be paid by the user himself (or herself).

Some concluding remarks should be made. It is noteworthy that a variety of patterns of the ageing process exists among different countries. However, the ageing structure in the Netherlands has shown to contain a smaller aged population group as compared to Sweden, Germany and the United Kingdom. For each of these countries the social

security system has a somewhat different structure, depending on a political or a more philosophical background. Social security in a welfare state may in general be governed by public policy or by market incentives (including personal responsibility). It is plausible to assume that financial stimuli have a positive influence on the use of certain amenities, an assumption which will be tested later on.

3. Economic and Policy Issues regarding Amenities for Older People in the Netherlands

Population projections for the Netherlands indicate a declining population beyond approx. the year 2020 (cf. CBS, 1987). The projected population in the year 2020 will be just over 16 million vis-à-vis 14.6 million people in 1987. The age structure of the population will shift towards less young and more older people. The regional distribution of this ageing process will not be uniform in the Netherlands: the impact of the ageing population will be different for Amsterdam, Rotterdam and The Hague, mainly because these municipalities now have a relatively older population. As compared to the age-structure of the other cities and regions in the Netherlands, the age structure of these larger cities will change in favour of relatively less elderly people (cf. CBS, 1987a).

Some authors point out several positive effects on social costs of an ageing society (see also Klaassen and van der Vlist, 1987, Heroverwegingswerkgroep, 1986, Kronjee, 1987). These effects are, for example, the high purchasing power of various older people, the lower need for schools, the higher traffic safety, the low extent of criminal activities by the elderly. On the other hand, in general older people need more care, e.g. sheltered housing or more medical care, and therefore the cost of these amenities will grow. In the Netherlands, society tends to grow from family traditions and family care towards a more individualistic life style. This individualism has implications for both the supply of volunteers who can look after

dependent people, and the need for professional care for the more dependent older people.

In the Netherlands some political parties (e.g. CDA, D66) have recently initiated the discussion (see their discussion notes mentioned in the references) regarding the characteristics of a future society, in view of the financial burden that comes along with an ageing society. Since it has now become clear that an older population brings along higher public expenditures, government is facing growing costs of an ageing society. Some figures will be presented to show the financial burden the society may be facing in 1991 for amenities for the elderly (cf. SCP, 1984). These aminities are mainly: old age pensions, family nursing, old age homes, nursing homes, district nursing services, subsidies on rents. While in 1981 total expenditures on these amenities were approx. 10.8 mld Dfl., in the year 1991 these expenditures will be approx. 4.8 mld Dfl. higher; this means an increase of about 40 percent. From these expenditures only about twenty percent will be charged to the users of these amenities, so that as a final result the society has to pay about eighty percent of the total expenditures on the amenities.

The main aim of remaining part of this the paper is to provide more insight into the impacts of changing financial contribution schemes of expenditures on the size and distribution of amenities for the elderly. It is noteworthy that not only the number of older people will increase (both relatively and absolutely), but also the socioeconomic structure of this population will undergo significant changes. Consequently, a simple extrapolation of demand for health care and other services, based solely on projected increases in population size, is an incorrect analytical tool for assessing the economic impact of the ageing of population in the Netherlands. For example, significant age differences exist within the population aged 65 years or over, in terms of sex composition, living arrangements, family structure, employment experiences, sources and level of income, and related psychological attitudes such as social expectations and life

satisfaction. Therefore, in the present paper the orientation regarding the socio-economic consequences of an ageing population will be also age-specific. The focus of the paper will be less on making point predictions for economic impacts of ageing in a set of fixed years ahead, but more on tracing the consequences (sometimes abrupt changes) for current patterns of demo-economic developments.

4. A Conceptual Model for the Supply and Demand of Amenities for the Elderly

The social, physical and psychological conditions of older people differ from those of the average population. Consequently, older people need more medical care, nursing, assistance in housekeeping, etc. Sometimes aged people are no longer capable of living on their own and may have to move to an old-age home or nursing home.

It has been demonstrated in the previous sections that demo-economic processes are complex dynamic phenomena which deserve a thorough analytical treatment. In this section a simplified but operational model will be developed in order to create an analysis framework for studying supply and demand of amenities for the elderly in an empirical way. We commence our analysis supposing that there are several groups of consumers (households) in society. Each group has its own characteristics (attributes), notably: need for elderly care (medical, socio-psychological etc.), marital status and age.

Furthermore, each household i is supposed to be guided by the following well-behaved (i.e., concave) utility function (U):

$$\text{Max } U_i = f (x_{i1}, \ldots, x_{iJ}) \qquad (1)$$

where: x_{ij} = the amounts, consumed by household i of commodities of type j (j = 1,...,J)

The budget constraint for a household i is:

$$\sum_j (p_{ij} * x_{ij}) = Y_i \qquad (2)$$

where: Y_i = disposable income of a household i
p_{ij} = the price level of commodity j for a household i

Total income per household (Y_i) can be decomposed into:

$$Y_i = Y1_i + Y2_i \qquad (3)$$

where $Y1_i$ = income of household i, capital reserve system
$Y2_i$ = income of household i, 'pay as you go' system

Next, income accruing from a 'capital reserve system' can be described as:

$$Y1_i = P_i + L_i \qquad (4)$$

where P_i = (individual) old-age pension
L_i = life-insurance pension

Next, the following components of income emerging from a 'pay as you go' system for households are distinguished:

$$Y2_i = AOW_i + IHS_i + SS_i \qquad (5)$$

where AOW_i = (collective state-provided) old-age pension
IHS_i = income dependent housing subsidies
SS_i = social securities income

In general, the individual demand function of a household i for commodity type j may then be assumed to be equal to:

$$x_{ij} = f (p_{i1}, \cdots, p_{iJ}, Y_i) \qquad (6)$$

In the framework of the paper we focus attention in particular on the specific amenities for the elderly. Hence two categories of consumption goods can be defined:

1. Category H (h_{ik}): type of consumption related to housing, medical care, social care, etc. There are K (k = 1,...,K) types of category H commodities. Consumption expenditures per household i on consumption of category H (H_{ik}) are then equal to:

$$H_{ik} = h_{ik} * p^{H}_{ik} \qquad (7)$$

where h_{ik} is a consumption good k belonging to category H for a household i, and p^{H}_{ik} is the price of a consumption good k belonging to category H for a household i. The dependency of p^{H}_{ik} on household i is caused by the user-specific price to be paid for certain old-age facilities.

2. Category R (r_{il}): remaining types of consumption goods. This class comprises L types of consumption goods (l=1,...,L). Then the consumption expenditures per household i on consumption of category R (r_{il}) are:

$$R_{il} = r_{il} * p^{R}_{l} \qquad (8)$$

where r_{il} is a consumption good l belonging to category R for a household i, and p^{R}_{l} is the price of a consumption good l belonging to category R.

Here h_{ik} and r_{il} are elements of the overall set X (x_{ij} being an element of X).

The individual use of amenities may depend on the price the user has to pay, while in some cases the user-price depends on the supply-regulated financial contribution schemes for these amenities. In the financial contribution schemes the price is an income-based price: a household with a high income pays more for the use of a certain type

of amenity than another household that has less income. It should be noted that in general the price of category H consumption goods is therefore not a true market price. The price to be paid by the user may depend partly on his/her income and assets. Especially in the Dutch social security system there is a complex set of regulations and rules that determine how much subsidy an individual household may receive for the costs of amenities. The calculation of the price of category H consumption goods (p^H_{ik}) is fairly complicated and can be represented by the following general equation:

$$p^H_{ik} = f_k(p^{H,au}_k, Y_i, A_i) \qquad (9)$$

where : $p^{H,au}_k$ is an autonomous part of the user price

A_i = the total (given) assets per household i

In the Annex, an illustrative calculation for the so-called financial contribution scheme for home help for the elderly is given. The curve, representing the relation between the prices and the income, is kinked in order to provide the possibility for a minimum and a maximum price. This means that people need not pay more than a certain maximum price for the amenity.

Consequently, the demand function for the volume of commodities of type k (from category H) by household type i is:

$$h_{ik} = f (p^H_{i1}, \ldots , p^H_{iK}, p^R_{i1}, \ldots , p^R_{iL}, Y_i) \qquad (10)$$

with p^H_{ik} described as in equation (9).

Now the main analytical question is: which factors determine the consumption of category H goods (h_{ik})?
The answer to this question will require an empirical estimation of demand equation (10). Only in this way the relevant contribution of

the successive prices and income to the explanation of demand behaviour can be assessed. This however requires micro data on individual households in the category of the elderly, but unfortunately in general surveys or panel data on this issue are very rare. In the framework of our study for the Netherlands a set of relevant data was however available, which can be used for analysis and prediction (by means of micro-simulation). This will be discussed in the sections 5 and 6.

5. The Case of the Province of Zeeland

In 1982 and 1983 a research project (Provincie Zeeland, 1983/84, Van der Vlist, 1984) has been carried out on strategic planning for amenities for the elderly (persons over 65 years of age). The background of this study was the politically determined idea that the number of places in old age homes should be 7 percent of all persons over 65 years. However in Zeeland the aged population is relatively old compared to the average aged population in the Netherlands. Because the aged elderly have a higher need for care than could be satisfied in old age homes, it was taken for granted that this 7-percent rule would not hold for the province of Zeeland. The research project concerned aimed at finding a structure of amenities for housing and caring for older people in the province of Zeeland, bearing in mind that

- these persons would stay at home as long as possible
- costs for society would not be too high.

One of the main results was the comparison in terms of social costs on different types of living facilities for the elderly.

One of the important methods in the research was the use of structured interviews. More than 600 persons of 65 years and older were interviewed, many of them still living on their own. All persons were asked about personal conditions, their health situation, living

arrangements, income situation, use of amenities and need for care. In our research the data set from these interviews has been used.

In the framework of our analysis several groups of households are distinguished (see also chapter 4). The analysis can be performed for each group with the following characteristics:

(A) need for elderly care:
  1 no need for help
  2 need for intermittant help
  3 need for daily help
(B) marital status:
  1 not living alone
  2 living alone
(C) age:
  1 older than 75 years (born before 1908)
  2 older than 65 years but younger than 75 years (born between 1917 and 1908)

This means that there are 12 (3*2*2) groups of people for which an empirical estimation of model (10) should be carried out. Consequently, the data tables which have been composed now have the following structure (see Table 2):

Table 2. Number of households by marital status and living situation

			living on their own	living in an old age home
No need for help	not living alone	>75 years	46	1
		65-75 years	112	0
	living alone	>75 years	49	2
		65-75 years	39	0
Need for intermittant help	not living alone	>75 years	47	1
		65-75 years	32	0
	living alone	>75 years	90	11
		65-75 years	23	0
Need for daily help	not living alone	>75 years	21	4
		65-75 years	11	0
	living alone	>75 years	19	29
		65-75 years	3	0
Number of households			492	48

This table shows that the group of households in our data set, living in an old age home, is relatively small compared to the group of households, living on their own. For practical reasons at this moment no further differentiation than only one characteristic is made between groups, because if we would make a distinction between all characteristics at the same time, we would be facing a rather large number of (almost) empty data cells, a common problem in cross-tabular classifications. This means that the analysis is now performed for one characteristic at the time.

6. An Application of the Model for Zeeland

Consumption good k is dealt with in a simplified way here on the basis of two categories: living on their own (k=1) and living in an old age home (k=2). People staying in a nursing home are not included in the analysis.

The hypothesis to be tested in this section will be that in general in the choice of the elderly for consumption good k (h_{ik}) the price of k (p^H_{ik}) has a significant influence. The assumption is that when prices are relatively high, people tend to choose for the cheaper good. In the meanwhile only the price variable is a dependent variable. In a more complete analysis the income variable has to be taken into account also.

The variable 'price' is p^H_{ik}, i.e. the price of category H consumption goods k for household i. In our analysis only two types of goods of category H for the elderly have been distinguished. The price of consumption good 1 contains rent or redemption of mortgage, service cost for the house, cost for food and cost for home help facilities (See the Annex). The price of consumption good 2 is based on the financial contribution scheme for old age homes, and holds for the cost of living, food and care. So the price of category H contains the price of consumption good 1 and the price of consumption good 2.

The test of the above mentioned hypothesis requires an estimation to be carried out by means of empirical data. The application was based on the data from the Zeeland survey. Because the dependent variable consists of categorical data, standard regression could not be used. Hence estimation was performed by using multinomial logit analysis (cf. McFadden, 1981, Fischer and Nijkamp, 1987, Wrigley, 1986).

The model is specified as: $\text{Living arrangement}_{ki} = a_1 * \text{price}_{ki}$, where $\text{living arrangement}_{ki}$ can be a household living on its own (k=1) or a household living in an old age home (k=2). The variable $\text{living arrangement}_{ki}$ has a value "0" if the household is living on its own (k=1), and has a value "1" if the household is living in an old age home (k=2); a_1 is the price sensitivity parameter.

The model itself does not include a constant term; inclusion of such a term will of course reduce the explanatory power of the price variable, but may even lead to insignificant results.

The price is an alternative-specific variable. It is influenced not only by the characteristics of the household i, but depends also on the given living arrangement k (k=1,2). When the household lives on its own (k=1), the price_{1i} is the price of living arrangement k=1, and when the household lives in an old age home (k=2), the price_{2i} is the price of living arrangement k=2.

The estimated model can be described as a multinomial logit model:

$$p_{ki} = \frac{\exp(\text{living arrangement}_{ki})}{\sum_t \exp(\text{living arrangement}_{ti})} \qquad (11)$$

Logit analysis on equation (11) is carried out for each group by need for elderly help, group by marital status or age group. The estimation results are given in the Table 3.

Table 3. Estimation results for the models for all households and for groups by need for elderly care, marital status and age.

	price
All households	-2.94**
No need for help	-7.84**
Need for intermittant help	-3.33**
Need for daily help	-0.48
Not living alone	-4.23**
Living alone	-2.31**
Older than 75 years	-2.05**
Older than 65 years but younger than 75 years	-

** significant at a 1 percent level

Table 3 shows that for all groups the results correspond in having the same sign and being significant, except for the group that needs daily help. Consequently, for this group no significant model could be estimated. In the case of households younger than 75 years but older than 65 years no model was developed, because in our sample no households from this class were living in an old age home. In addition to the results presented in Table 3, also experiments encompassing additional explanatory factors, viz. income, loneliness, and partner's need for care, have been carried out. In general, these experiments did not lead to improvements of the results.

From table 3 it can be seen that the magnitude of the coefficients in general may be assumed to be quite plausible. E.g. the analysis for the groups with certain need for elderly care shows that for the group with no need for help the coefficient is small (i.e. the most negative) as compared to the groups with need for help. On the other hand, the coefficient for the group with need for daily help is larger (the least negative) than the coefficient for the group that

needs intermittant help. This may be due to the fact that households with the highest need for care are the least sensitive for price changes, because they in fact have no choice in either living on their own or living in an old age home. Living on their own would not satisfy their need for daily help, and in an old age home they would be certain to get enough help.

The next step will be to examine the influence of government policy on the choice of amenities for the elderly by changing the financial contribution schemes. A first experiment is carried out for the financial contribution schemes of home help facilities and old age homes. In the Annex the financial contribution scheme on home help facilities is given.

This experiment is performed by means of micro simulation. The micro simulation technique is applied on micro-level data, e.g. observations on firms, households or persons. Micro simulation models (MSM) are developed to investigate the impacts of changes in individual conditions. These changes in conditions may be performed in general terms, but at the individual level the changes in conditions may be quite specific. For example, a change in income tax schemes works for all people. However, when a change in income tax schemes applies to the taxation of the higher incomes, only the group that has higher incomes bears the burden or benefits of this change in income tax schemes.

In our analysis changes in the financial contribution scheme of home help and of the old age homes are simulated. The basis is formed by the estimated demand function from Table 3. Our focal point of interest is on the changing use of amenities caused by changes in the financial contribution scheme of home help facilities. Simulations have been carried out on the living conditions of households over 65 years of age. Six simulations are presented:

1. The price per hour that the user of home help facilities has to pay is doubled.
2. The maximum contribution per week for home help facilities is increased with about 50 percent.

3. The maximum contribution for home help facilities is changed for households not living alone. In our case financial contribution schemes for both households living alone and households not living alone exist in the Netherlands. One of the main differences between these schemes is the maximum contribution per hour for home help. Households not living alone pay ceteris paribus at the maximum level less for one hour home help than households living alone. It is simulated here that in the same circumstances households not living alone and households living alone both pay the same maximum price per hour, viz. the maximum price for households living alone. Consequently the maximum price per hour home help for households not living alone is higher.
4. Pocket money in an old age home is the same for households living alone and households not living alone.
5. Pocket money in an old age home is doubled for households living alone and households not living alone.
6. Pocket money in an old age home is reduced by half for both households living alone and households not living alone.

On the basis of the estimated demand functions of table 3 for each group within a category (need for elderly care, marital status, age) simulation was carried out. Consequently, the results of the simulation for the groups within a category were summed to obtain the total impact on the use of amenities by all groups of a change in financial contribution scheme. In addition, simulation has taken place with the estimated functions for all households. Table 4 presents the results of the simulations.

For the simulations 1 and 2 (home help price per hour is higher, home help maximum price per week is higher for both households living alone and households not living alone), Table 4 shows no significant changes in the use of facilities for the households living on their own. However, in simulations 3 and 5 the number of households living on their own declines, and in the case of simulation 3 this is entirely due to the households not living alone. Table 4 shows that the direction of changing use of amenities is the same in simulations 4

and 6 (pocket money is the same for households living alone and households not living alone, and pocket money is reduced by half for both households living alone and households not living alone).

Table 4. Simulation results on households (not living alone) living on their own or living in an old age home

	number of households living on their own (k=1)	number of households living in an old age home (k=2)
observed:	382	24
estimated (no simulation):		
all households	395	11
need for elderly care	396	10
marital status	395	11
age	398	8
1. Home help price per hour is higher		
all households	394	12
need for elderly care	395	11
marital status	394	12
age	398	8
2. Home help maximum price per week is higher for both households living alone and households not living alone		
all households	394	12
need for elderly care	396	10
marital status	395	11
age	398	8
3. Home help maximum price per hour is the same for households living alone and households not living alone		
all households	375	31
need for elderly care	387	19
marital status	382	24
age	389	17

(Table 4 continued)	number of households living on their own	number of households living in an old age home
4. Old age home: pocket money is the same for households living alone and households not living alone.		
all households	399	7
need for elderly care	400	6
marital status	399	7
age	401	5
5. Old age home: pocket money is doubled for households living alone and households not living alone.		
all households	312	94
need for elderly care	330	76
marital status	312	94
age	350	56
6. Old age home: pocket money is reduced by half for both households living alone and households not living alone.		
all households	401	5
need for elderly care	402	4
marital status	401	5
age	403	3

It can be seen for this illustrative set of simulation experiments that public policy stimuli have consequences for the use of amenities by the elderly. The change in use of amenities, however, may also be translated in terms of expenditures on these amenities. In this way opportunity costs of alternative facility configurations may be assessed from a social point of view.

7. Conclusions

In the Netherlands as in many other countries the population is ageing. In general older people need more physical, psychological and mental care. To prevent the financial burden that comes along with it, the government policy in the Netherlands is to stimulate people to live on their own instead of in old age facilities.

In our research we distinguished two types of amenities for older people: living on their own and living in a old age home. The purpose of this paper was to show the impacts of a change in the price for the use of these facilities. For this purpose a theoretical model was developed and estimated.

Consequently, the results of the estimated model are used for micro-simulation purposes. Supply-regulated price is used as a tool to simulate the impacts of the price for the use of amenities. It shows that the character of the change in prices (e.g. maximum price per hour for home help, maximum price per week for home help, less pocket money in old age homes) is very important to the user of the amenities in having a smaller or a larger effect in consumption of these amenities.

In the light of our previous results, issues for further research are:

- Translation from the number of users of amenities to expenditures on these amenities.
- Construction of a model based on a larger set of data from our sample.
- Extension of the model with restrictions, e.g. waiting-lists for old age homes. (The current model does not allow for queueing phenomena)
- Extension of the model by considering three living facilities for the elderly: living on their own, old age homes, nursing homes.
- Application of alternative financial contribution schemes, e.g. housing allowances, nursing homes.

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ANNEX. Financial contribution schemes for home help facilities.

In this Annex in a simplified way the financial contribution scheme for a household living alone will be explained. Also, for households not living alone corresponding financial contribution schemes will be given.

The price for one hour of home help is 8.25 Dfl. The user of home help has to pay the hours of home help times the price per hour. However, there are restrictions set to the total user financial contribution for home help. These restrictions depend on:

1. the income of the user of home help, and
2. the period of home help given.

In general, the maximum cost of home help per week can be described in relation to the income per month of the user:

$$C_{il} = a_1 * Y_i - a_0 \qquad (A1)$$

where: C_{il} is cost of home help per week for goods of category 1 (i.e., home help) for household i
Y_i is net income per month for household i

Here a_1 and a_0 are the coefficients that describe the financial contribution schemes for all groups. The coefficients are both positive. However, the magnitude of the coefficients is different for every group, depending on whether the user needs home help permanently (i.e. more than 13 weeks) or temporarily (i.e. less than or equal to 13 weeks).

For household (a) living alone and having need for permanent home help, the maximum cost per week is:

$$C_{al} = 0.0870 * Y_a - 87.0 \qquad (A2)$$

For household (b), living alone, that needs temporarily home help, equation (A1) can be described as:

$$C_{bl} = 0.1186 * Y_b - 118.6 \qquad (A3)$$

In addition to these maximum contribution functions depending on the income of the user of home help, there is an absolute maximum contribution for home help per week. This maximum level is 200 Dfl. per week for permanent users of home help and 305 Dfl. per week for temporarily users of home help.
The minimum contribution for home help per week is 2.75 Dfl.

In Figure 1 the relationship between income and the maximum financial contribution for home help is given.

The figure shows that the curve, representing the relation between the price and the income, is kinked in order to provide the

possibility for a minimum and a maximum price. As can be seen from the figure (or from the equations (A2) and (A3)) households temporarily using home help facilities, have a higher maximum price for the use of home help than households that need permanent home help. In a straightforward way the maximum price per week for home help can be obtained. If the maximum contribution per week is not yet reached, the user of home help has to pay for the hours of home help multiplied by its price. However, when the costs for home help exceed the maximum contribution, no more than this maximum contribution will be paid.

Equation (A1) is also valid as a financial contribution scheme for households not living alone. For a household (c) and (d), not living alone, a distinction is made between need for permanent home help (household (c)) and temporarily home help (household (d)). Now it holds:

$$C_{c1} = 0.0840 * Y_c - 121.4 \qquad (A2')$$

$$C_{d1} = 0.1188 * Y_d - 169.4 \qquad (A3')$$

It appears, however, that the coefficients are somewhat different from those of the equations (A2) and (A3). Again, the absolute maximum prices per week of home help are 200 and 305 Dfl. for the permanent and temporary use of home help respectively.

In Figure 1 a visualization of the equations (A2') and (A3') is given.

Figure 1. Net income per month and the maximum contribution for home help per week for a household living alone and for a household not living alone (with need for permanent home help or need for temporarily home help)